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NOTES ON GEOGRAPHIC DISTRIBUTION

Altella aussereri, *Mimetus laevigatus*, and *Trichoncyboides simoni* (Araneae: Dictynidae, Mimetidae, Linyphiidae), three species of spiders new for Slovakia

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Abstract. Three species of spiders (Araneae), *Altella aussereri* Thaler, 1990, *Mimetus laevigatus* (Keyserling, 1863), and *Trichoncyboides simoni* (Lessert, 1904), are reported from Slovakia for the first time. These new records originate from southern Slovakia. The record of *A. aussereri* provides new data on the distribution and natural history of this range-restricted species of very high conservation value. The records of *M. laevigatus* and *T. simoni* in Slovakia extend their known distribution in Central Europe. Characteristic features, pictures of the habitus, copulatory organs, and habitats are presented.

Key words. Arachnida, Central Europe, faunistics, first records, xerothermic habitats

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INTRODUCTION

In Central Europe, southern Slovakia belongs to a comparatively warm climatic region with a warm dry climate, long sunshine and mild winters (Bochníček et al. 2015), which is also reflected in the biodiversity of this region. The Burda, as the smallest and southernmost mountain range in Slovakia, is of great importance in terms of the thermophilic fauna of our territory (Muránsky 1996; Christophoryová et al. 2014; Straka and Majzlan 2016). It forms a buffer zone that circumvents the infiltration of the northern parts of the country by Pannonian and Mediterranean species (Majzlan 2016). The situation is similar for another mountain range in southern Slovakia, the Slovak Karst (Svatoň and Majkus 1988; Svatoň and Gajdoš 2008). During research on spider communities in southern Slovakia (Burda Mountains and Slovak Karst) in 2017–2023, we managed to discover three spider species new for Slovakia, specifically *Altella aussereri* Thaler, 1990, *Mimetus laevigatus* (Keyserling, 1863), and *Trichoncyboides simoni* (Lessert, 1904).

The family Dictynidae, which includes mostly small spiders with a developed cribellum (Bee et al. 2017; Gajdoš et al. 2018), includes 474 species classified into 53 genera (WSC 2024). There are 10 genera of this family in Central Europe (Nentwig et al. 2024). *Altella aussereri* has so far only been recorded in the Italian Southern Alps (Thaller and Noflatscher 1990). Until now, no records of this species became known from other mountain ranges.

The family Mimetidae includes small, fully araneophagous spiders with a highly specialized predatory behavior (Bee et al. 2017; Gajdoš et al. 2018). With 159 species placed in eight genera (WSC 2024), it represents a relatively small family of spiders. Only two genera of this family occur in Central Europe (Nentwig et al. 2024). *Mimetus laevigatus* (Keyserling, 1863) occurs from the Mediterranean to Central Asia. Within Central Europe, it has so far only been known from Hungary (Chyzer and Kulczyński 1918; Balogh 1933).

The family Linyphiidae, with over 4,837 species in 636 genera (WSC 2024), is one of the largest spider families. It is further subdivided into two subfamilies known as sheetweb spiders (Linyphiinae) and dwarf spiders (Erigoninae). Each of them is represented by medium-sized to tiny species often morphologically differing just by slight differences in copulatory organs (Roberts 1987; Bee et al. 2017; Gajdoš et al. 2018). An interesting feature of many species are the bizarre shapes of the male carapace, with various growths, bumps or thorns that play a role in mating (Uhl and Maelfait 2008; Kunz et al. 2012; Gajdoš et al. 2018;

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Milasowszky and Hepner 2018). There are 157 genera of this family in Central Europe (Nentwig et al. 2024). *Trichoncyboides simoni* (Lessert, 1904) is widespread in Central Europe, Italy, Romania, and Bulgaria (Thaler 1973; Heimer and Nentwig 1991; WSC 2024). Records of this species from Slovakia have been lacking so far.

We provide information on the first records of *A. aussereri*, *M. laevigatus*, and *T. simoni* in Slovakia and improve the knowledge of their distribution in Europe. Our findings also expand the knowledge about the Slovak and Central European spider fauna.

METHODS

The studied material was collected mainly in southwestern Slovakia. One female *Altella aussereri*, one male *Mimetus laevigatus*, and one female *Trichoncyboides simoni* were found in the Burdov National Nature Reserve (Burda Mountains) during research on arachnid communities in xerothermic and synanthropic habitats in 2017–2023. Also, one female of *M. laevigatus* was found in the Slovak Karst National Park (southeastern Slovakia) during a random individual collecting of spiders. Material was obtained from soil samples extracted by Berlese-Tullgren funnels (*A. aussereri*, *T. simoni*), individual collecting, and tree beating (*M. laevigatus*). Microscopic images of the habitus and copulatory organs and measurements were obtained using an Olympus SC 100 camera attached to an Olympus SZx16 stereomicroscope and edited with Olympus Stream basic. Images were taken in different focal planes, and stack images were combined using Zerene Stacker. All measurements are in millimeters. The specimens are preserved in 70 % ethanol and deposited in the collections of Institute Landscape Ecology Slovak Academy of Sciences in Nitra (**ILE SAS**, curators: P. Gajdoš, P. Purgat). Nomenclature follows World Spider Catalog (WSC 2024). Species distribution map data were obtained from the literature (Balogh 1933; Thaler 1973; Thaler and Noflatscher 1990; Buchar and Růžička 2002; Bosmans 2003; Kovács et al. 2012; Bosmans et al. 2013, 2019; Blick et al. 2016; Tamajón et al. 2017; Blagoev et al. 2018; Branco et al. 2019; Pantini and Isaia 2019; Kůrka et al. 2020; Lecigne 2021; Ponomarev 2022; Zarikian et al. 2022; Mousaid 2023; Atlas of European Arachnids 2024; Caron 2024; Chatzaki et al. 2024; Otto 2024). The base-map source is Esri, Maxar, Earthstar Geographics, and the GIS User Community.

RESULTS

Family Dictynidae O. Pickard-Cambridge, 1871

Altella aussereri Thaler, 1990

Figures 1–5

Altella aussereri—Thaler and Noflatscher 1990: 179, figs. 1–9 (♀)

Material examined. SLOVAKIA – NITRA REGION • Burda Mountains; Kamenica nad Hronom; 47°49.69′N, 018°45.58′E, 330 m elev.; 5.XI.2017; P. Ľuptáčik leg.; sparse xerothermic forest, ash tree detritus; soil sample; 1 ♀, ILE SAS-93624.

Distribution. This species is recorded only from xerothermic habitats of the Southern Alps in Italy (Thaler and Noflatscher 1990; Figure 1).

Identification. Habitus: body length of our specimen is smaller than minimal body length published by Thaler and Noflatscher (1990). **Epigyne:** epigastric furrow indistinct, anteriorly sharply bordered, with ridge protruding over opening and seminal receptacles shining through the cuticle (Figure 4). Seminal receptacles direct laterally and do not medially converging as in other Slovak species of *Altella biuncata* and *Altella lucida* (Thaler and Noflatscher 1990; Nentwig et al. 2024). Fertilisation ducts of our specimen are located more longitudinally along the seminal receptacles than in the specimens illustrated by Thaler and Noflatscher (1990) (Figure 4). **Female leg:** in the middle of tibia of III. leg is a single ventral bristle (Thaler and Noflatscher 1990) (Figure 5).

Measurements of the specimen (♀) (Figure 3). Body length 1.13; carapace 0.50 long, 0.37 wide; opisthosoma 0.66 long, 0.42 wide.

Comment. The genus *Altella* consists of 11 species distributed mainly in Europe and southern, southwestern, and central Asia (WSC 2024). Six species of this genus occur in Europe (Nentwig et al. 2024). In Slovakia, the species *A. biuncata* (Miller, 1949) and *A. lucida* (Simon, 1874) have so far been recorded from warm and sunny habitats such as steppes, forest steppes and open deciduous forests, where they are often found under stones (Franc 2010; Franc and Fašanga 2017).

Altella orientalis Balogh, 1935, described from nearby Hungary (Balogh 1935), has not been illustrated since its first description. However, the original description does not provide any illustrations of the genitalia, but given some somatic characters provided, e.g. the spination, it seems close to *A. aussereri*.

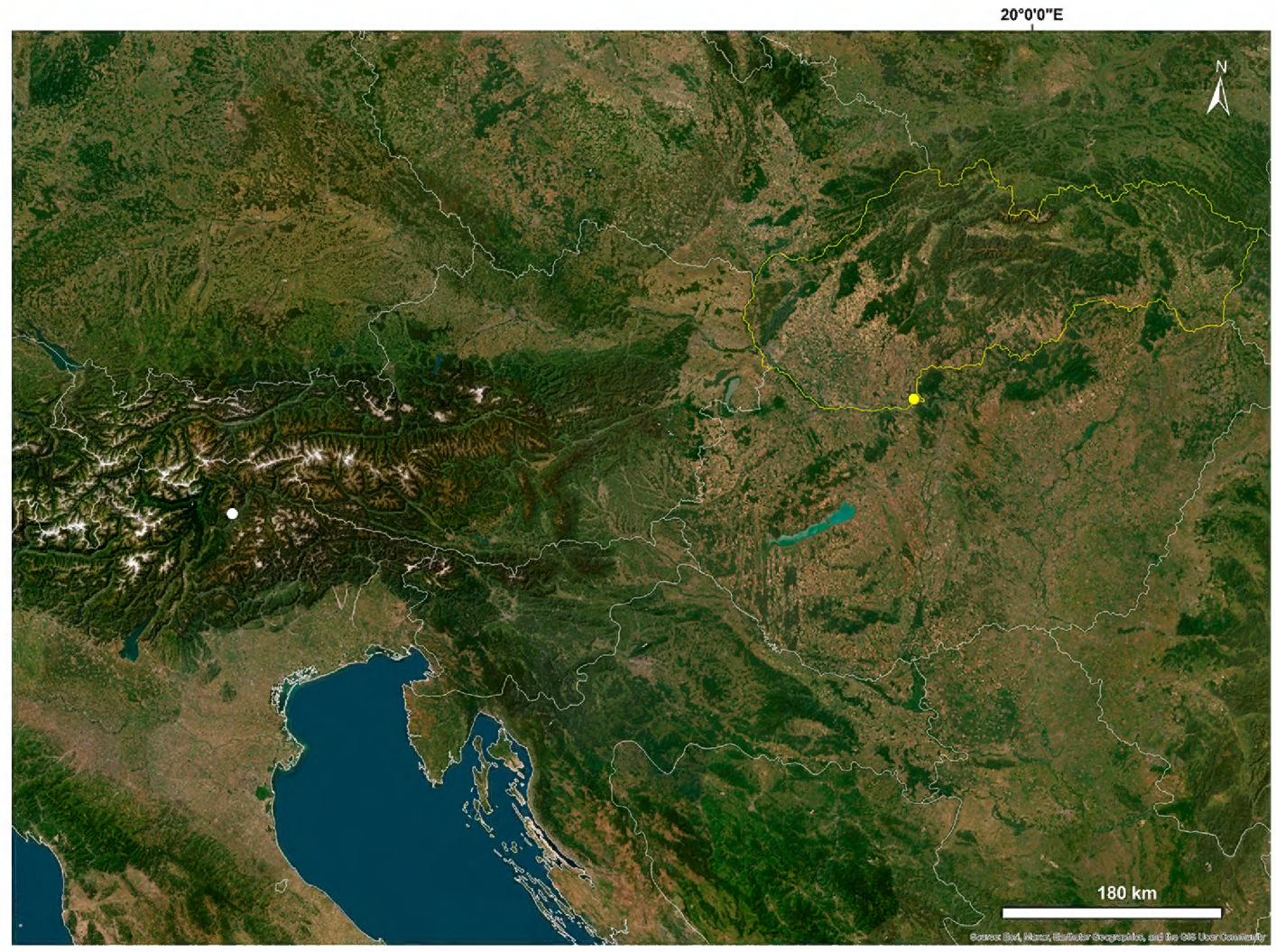

Figure 1. Distribution of *Altella aussereri* in Europe; Slovakia, Italy; yellow line = Slovak border, white circle = records with high precision, yellow circle = new record.

Figure 2. Locality of new record of *Altella aussereri* in Slovakia; Burdov National Reserve, sparse xerothermic forest (photo by P. Fend'a).

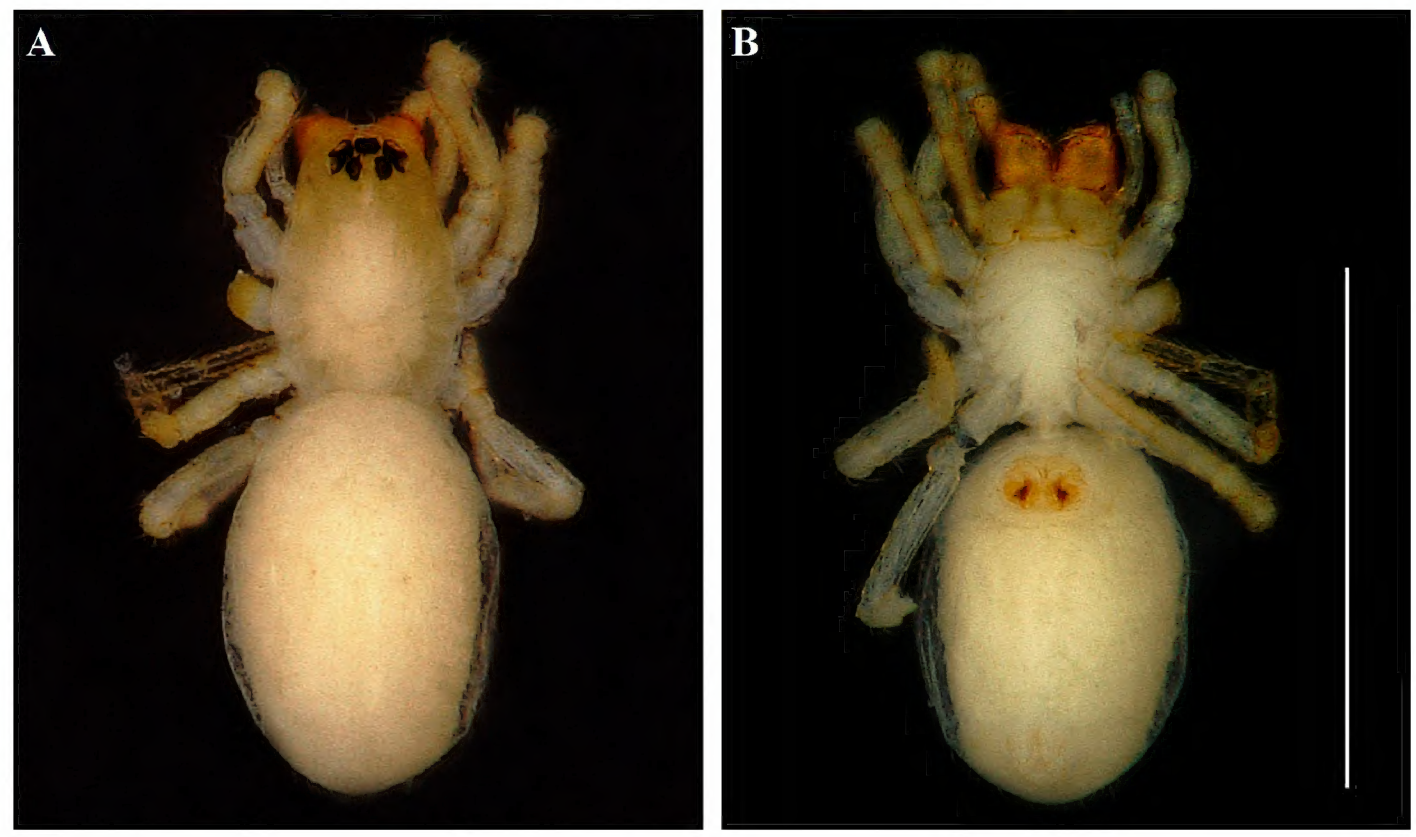

Figure 3. *Altella aussereri* Thaler, 1990, female from Slovakia. **A.** Dorsal view. **B.** Ventral view. Scale bar = 1 mm.

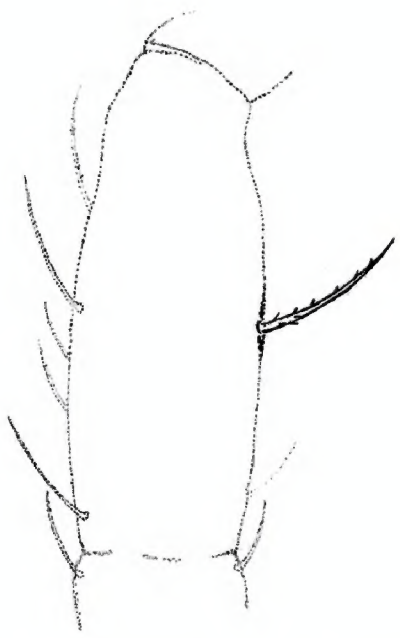

Figure 5. *Altella aussereri* Thaler, 1990, female from Slovakia, line drawing of diagnostic single ventral bristle on Tibia III.

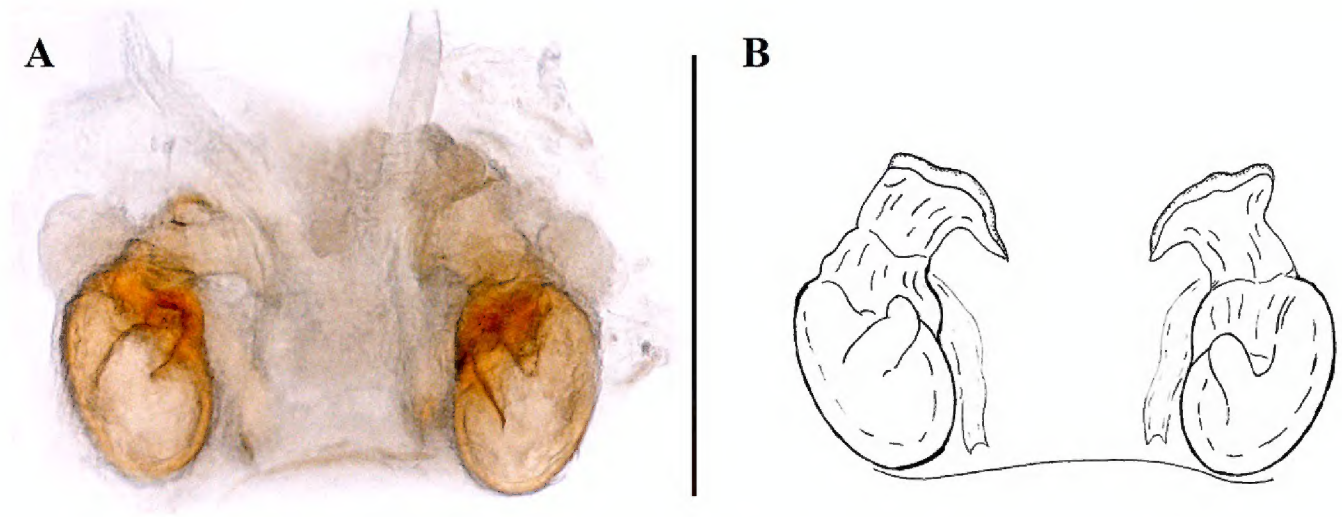

Figure 4. *Altella aussereri* Thaler, 1990, female from Slovakia. **A.** Vulva. **B.** Line drawing of vulva. Scale bar = 0.1 mm.

Unfortunately, the type material seems to be lost or misplaced (Lazányi-Bacsó pers. comm.), so the status of the species remains unknown. *Altella hungarica* has a markedly different epigyne structure compared to *A. aussereri* and is much larger (Loksa 1981; Ponomarev 2017).

Family Mimetidae Simon, 1881

***Mimetus laevigatus* (Keyserling, 1863)**

Figures 6–10

Mimetus laevigatus—Simon 1932: 776, figs. 1124–1125 (♂♀)

For the complete list of taxonomic references, see WSC (2024).

Material examined. SLOVAKIA – Nitra region • Burda Mountains; Kamenica nad Hronom; 47°49.53′N, 018°44.90′E, 150 m elev.; 15.VII.2019; V. Hošek leg.; interior of house; individual collecting; 1 ♂, ILE SAS-56438 – Banská bystrica region • Slovak Karst; Ozdín; 48°29.09′N, 019°40.08′E, 480 m elev.; 14.VIII.2023; M. Prince leg., on *Tetragnatha* sp. web on deciduous tree, ecotone of south-facing, calcareous, grassland and stunted deciduous forest over limestone pavement; tree beating; 1 ♀, ILE SAS-1899.

Distribution. This species is recorded from 16 European countries, and it is known from France to eastern European Russia in the north, and from the Iberian Peninsula to the southern European Russia in the south. Within Central Europe, this species has so far been known from Hungary (Chyzer and Kulczyński 1918; Balogh 1933) (Figure 6).

Identification. Male pedipalp: embolus rounded, with a slightly broad cymbium on its outer margin, rounded anteriorly and fringed with a line of 8–10 bristles. The tibial apophysis is relatively short and conical (Simon 1932) (Figure 9). **Epigyne:** brown, transversely oval with a deep epigastric furrow with the anterior margin slightly thickened (Simon 1932) (Figure 10).

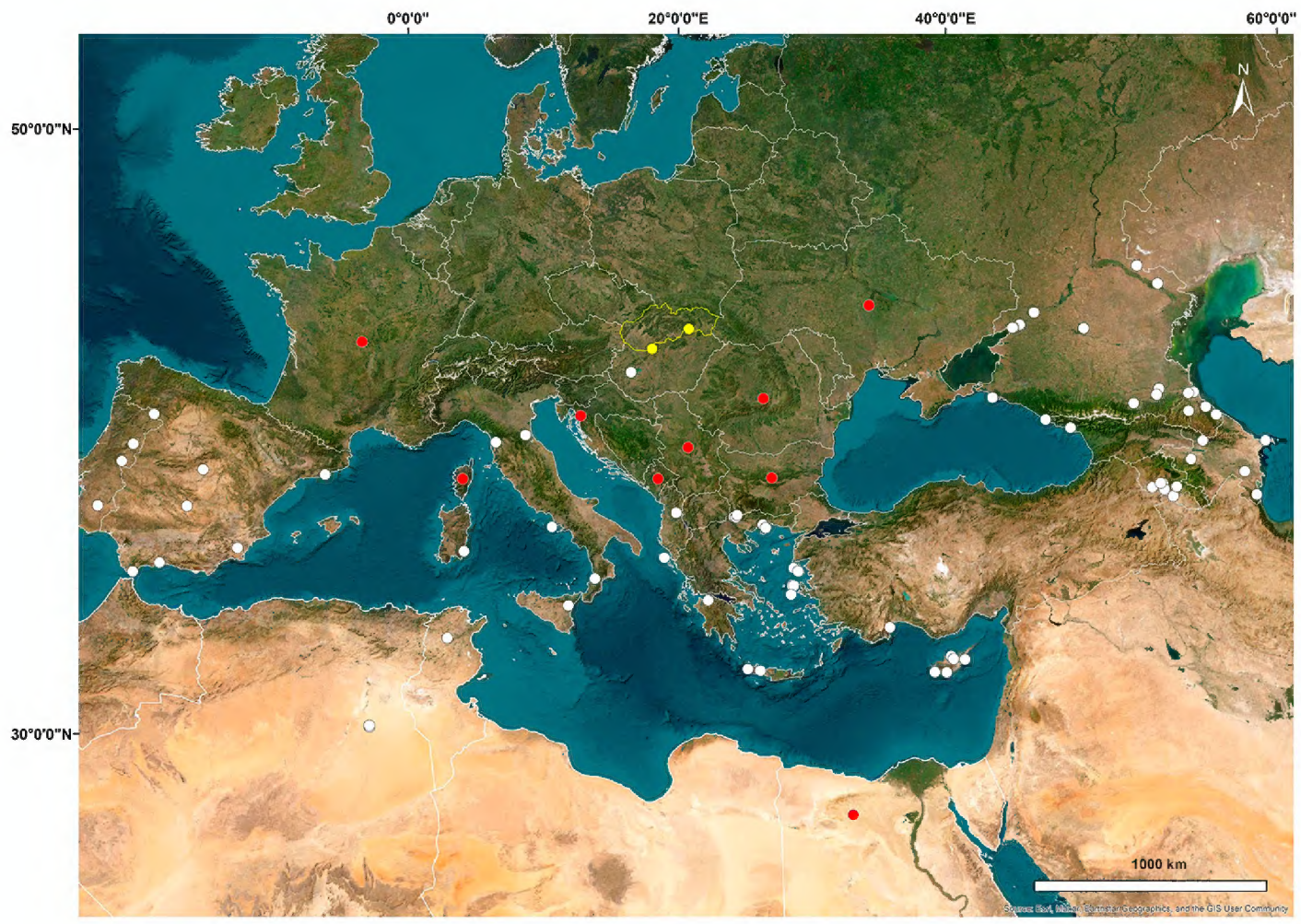

Figure 6. Distribution of *Mimetus laevigatus* in Mediterranean and Eurasia; Albania, Algeria, Armenia, Azerbaijan, Bulgaria, Croatia, Cyprus, Egypt, France, France / Corsica, Georgia, Greece, Greece / Crete, Hungary, Italy, Italy / Sardinia, Italy / Sicily, Montenegro, Morocco, Portugal, Romania, Russia / Eastern, Russia / Southern, Serbia, Slovakia, Spain, Tunisia, Türkiye (Asia), Ukraine; yellow line = Slovak border, white circle = records with high precision, yellow circle = new records, red circle = records with regional precision.

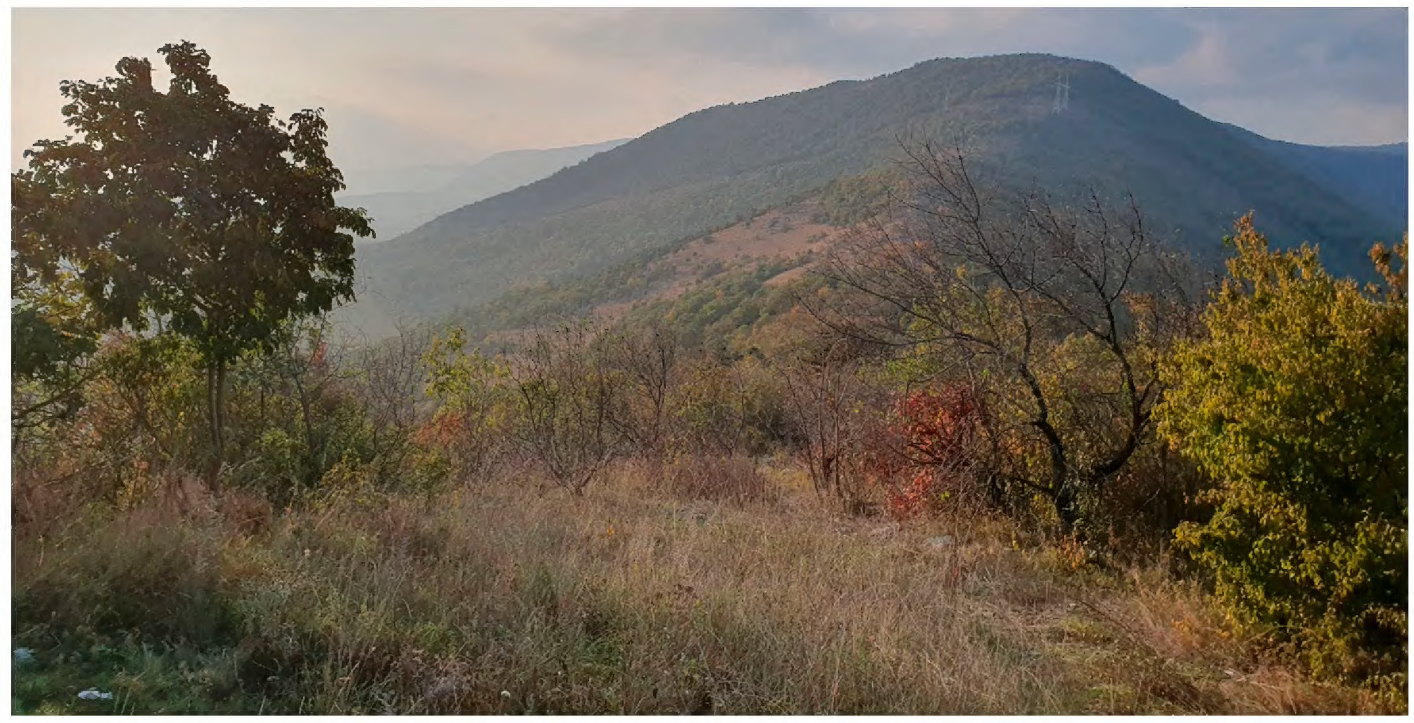

Figure 7. Locality of new record of *Mimetus laevigatus* in Slovakia; Slovak Karst National Park, ecotone of south facing, calcareous, grassland and stunted deciduous forest over limestone pavement (photo by M. Prince).

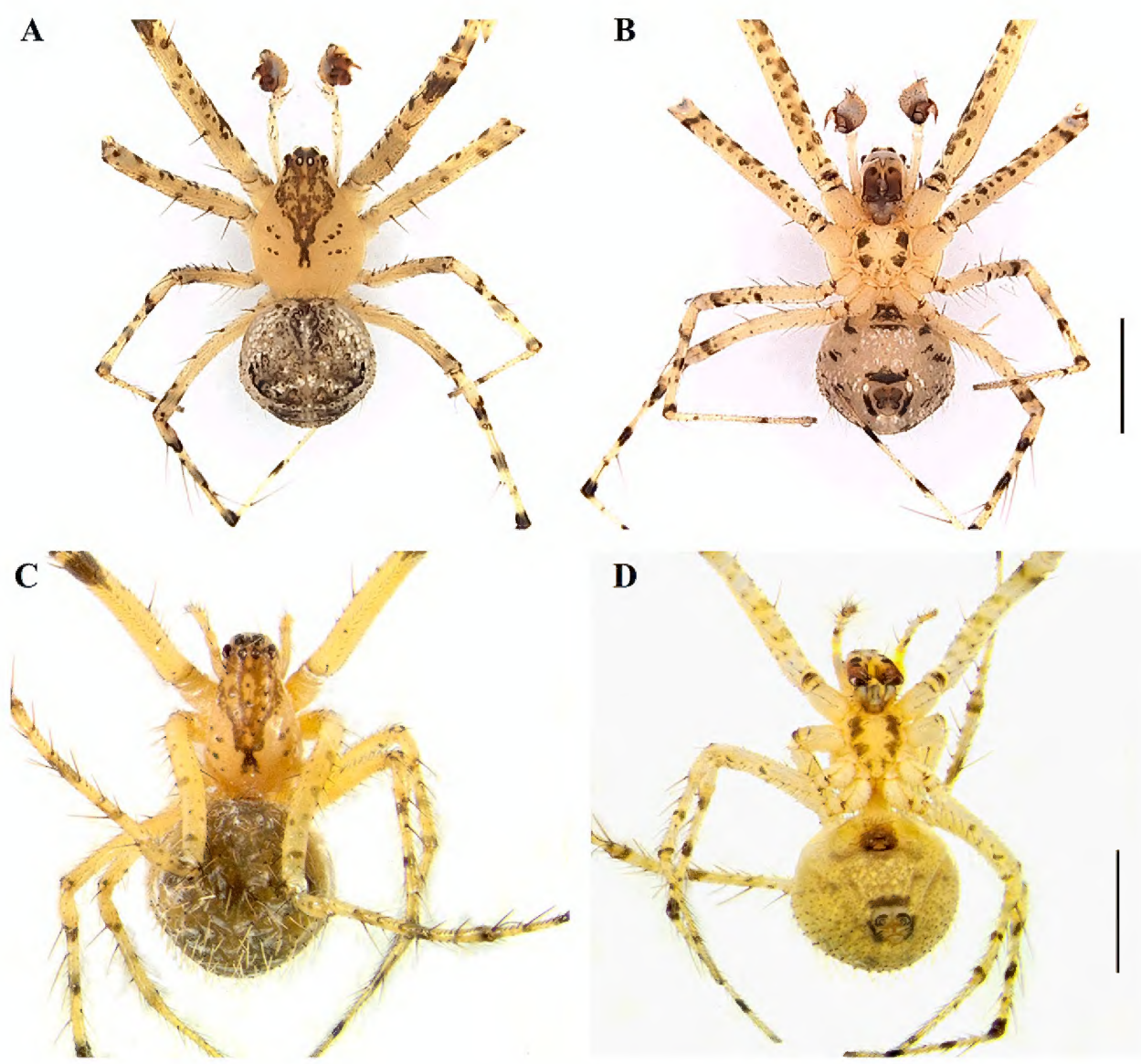

Figure 8. *Mimetus laevigatus* (Keyserling, 1863), specimens from Slovakia. **A.** Male, dorsal view. **B.** Male, ventral view. **C.** Female, dorsal view. **D.** Female, ventral view. Scale bars: 2 mm.

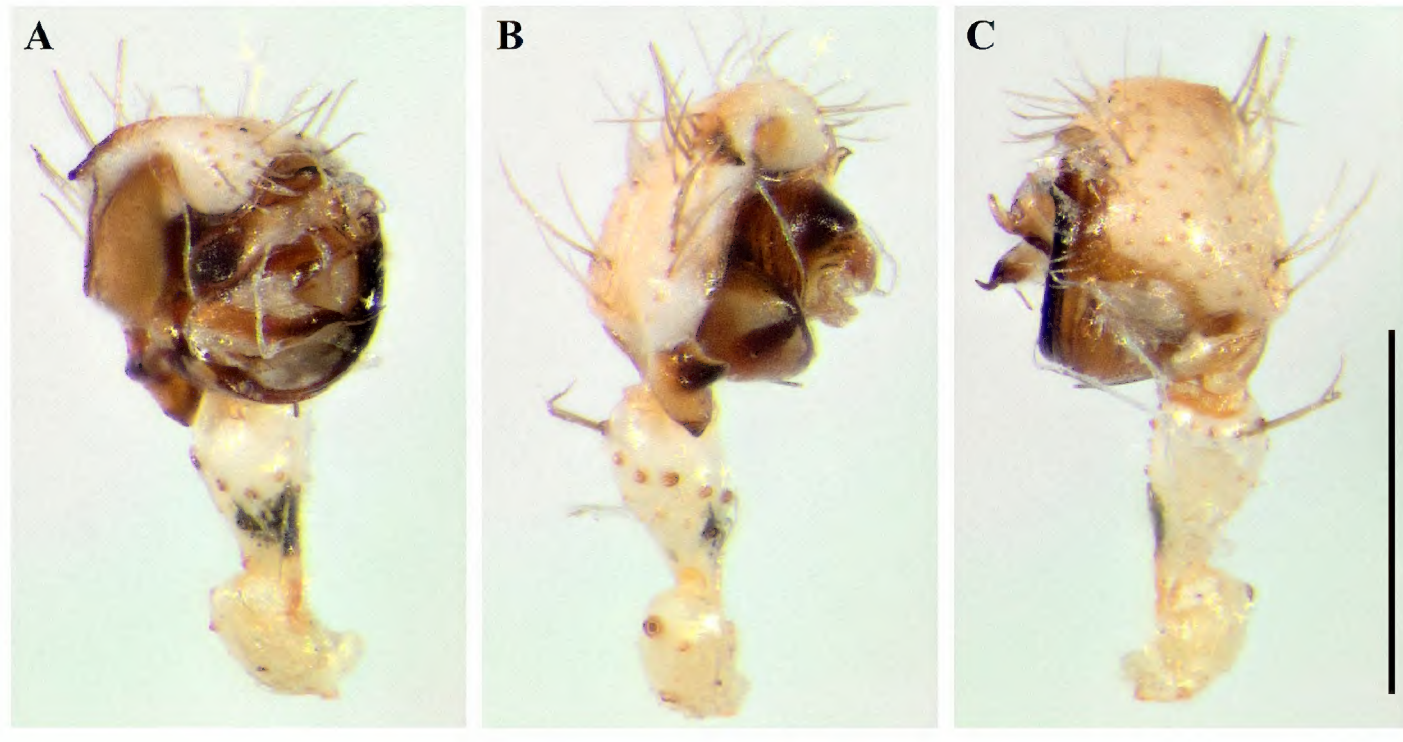

Figure 9. *Mimetus laevigatus* (Keyserling, 1863), male from Slovakia. **A.** Right pedipalp, ventral view. **B.** Idem., retrolateral view. **C.** Idem., prolateral view. Scale bar: 1 mm.

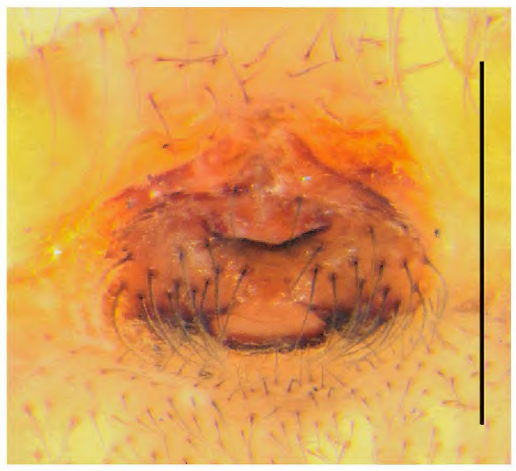

Figure 10. *Mimetus laevigatus* (Keyserling, 1863), female from Slovakia, epigyne. Scale bar: 1 mm.

Measurements of the specimens (♂♀) (Figure 8). ♂: body length 4.47; carapace 2.40 long, 1.83 wide; opisthosoma 2.02 long, 2.19 wide. ♀: body length 4.69; carapace 2.11 long, 1.27 wide; opisthosoma 2.23 long, 2.45 wide.

Comment. A species with a preference for xerothermic habitats, where it lives on shrubs, trees, and the ground (Bosmans et al. 2019; Lecigne 2021).

Family Linyphiidae Blackwall, 1859

***Trichoncyboides simoni* (Lessert, 1904)**
Figures 11–14

Tapinocyboides simoni—Thaler 1973: 56, figs. 49–51 (♀)
For the complete list of taxonomic references, see WSC (2024).

Material examined. SLOVAKIA – NITRA REGION • Burda Mountains; Kamenica nad Hronom; 47°49.62′N, 018°45.50′E, 290 m elev.; 17.III.2018; P. Fend'a leg.; oak–hornbeam forest; soil sample; 1 ♀, ILE SAS- 93610.

Distribution. This species is recorded from nine European countries, and it is known from Germany, Switzerland, and France in the west, through Czech Republic, Austria, Slovenia, and Hungary, Romania, and Bulgaria in the east (Nentwig et al. 2024) (Figure 11).

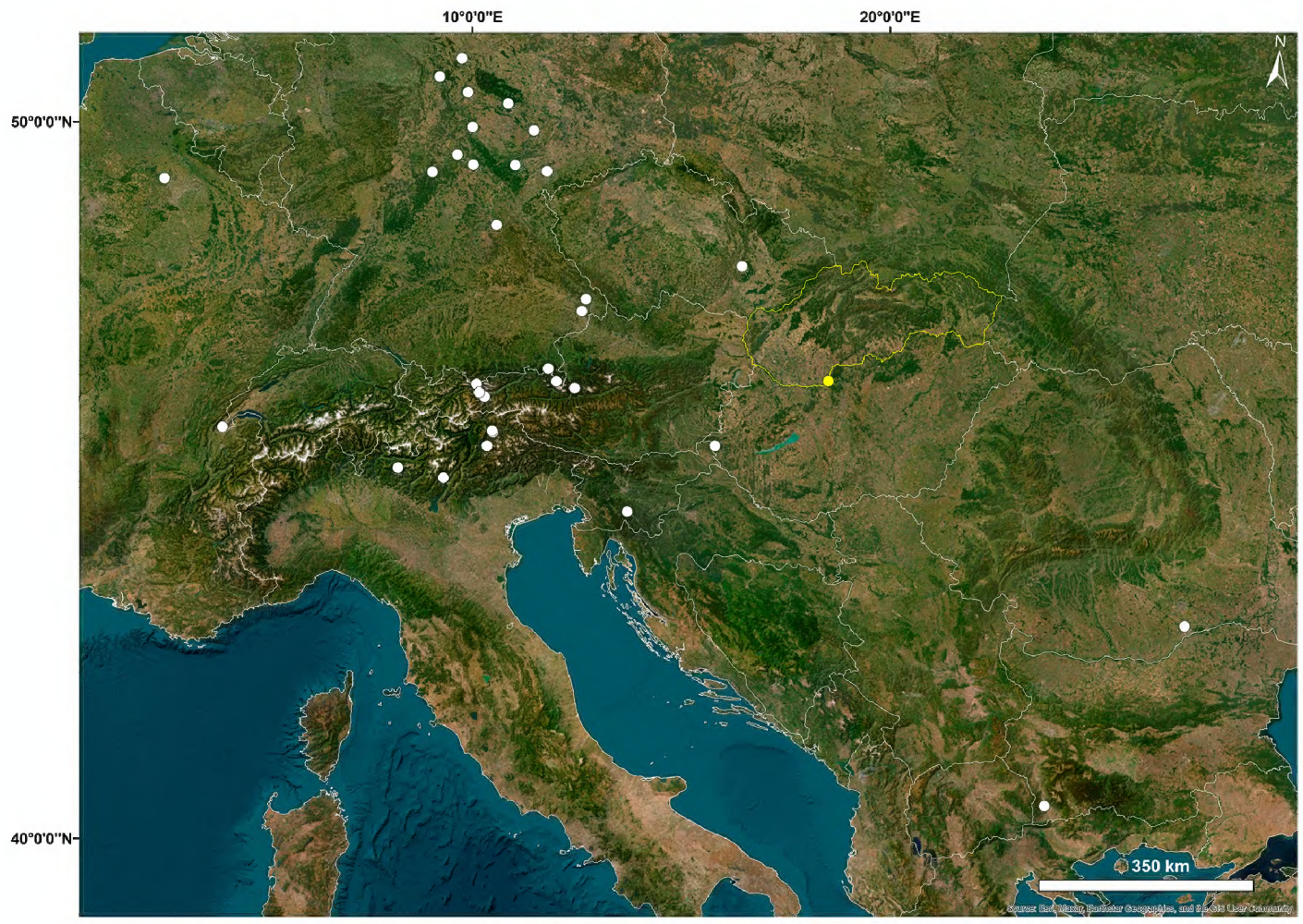

Figure 11. Distribution of *Trichoncyboides simoni* in Europe; Austria, Bulgaria, Czechia, France, Germany, Hungary, Italy, Romania, Slovakia, Slovenia, Switzerland; yellow line = Slovak border, white circle = records with high precision, yellow circle = new record.

Figure 12. Locality of new record of *Trichoncyboides simoni* in Slovakia; Burdov National Reserve, oak–hornbeam forest (photo by L. Švecová).

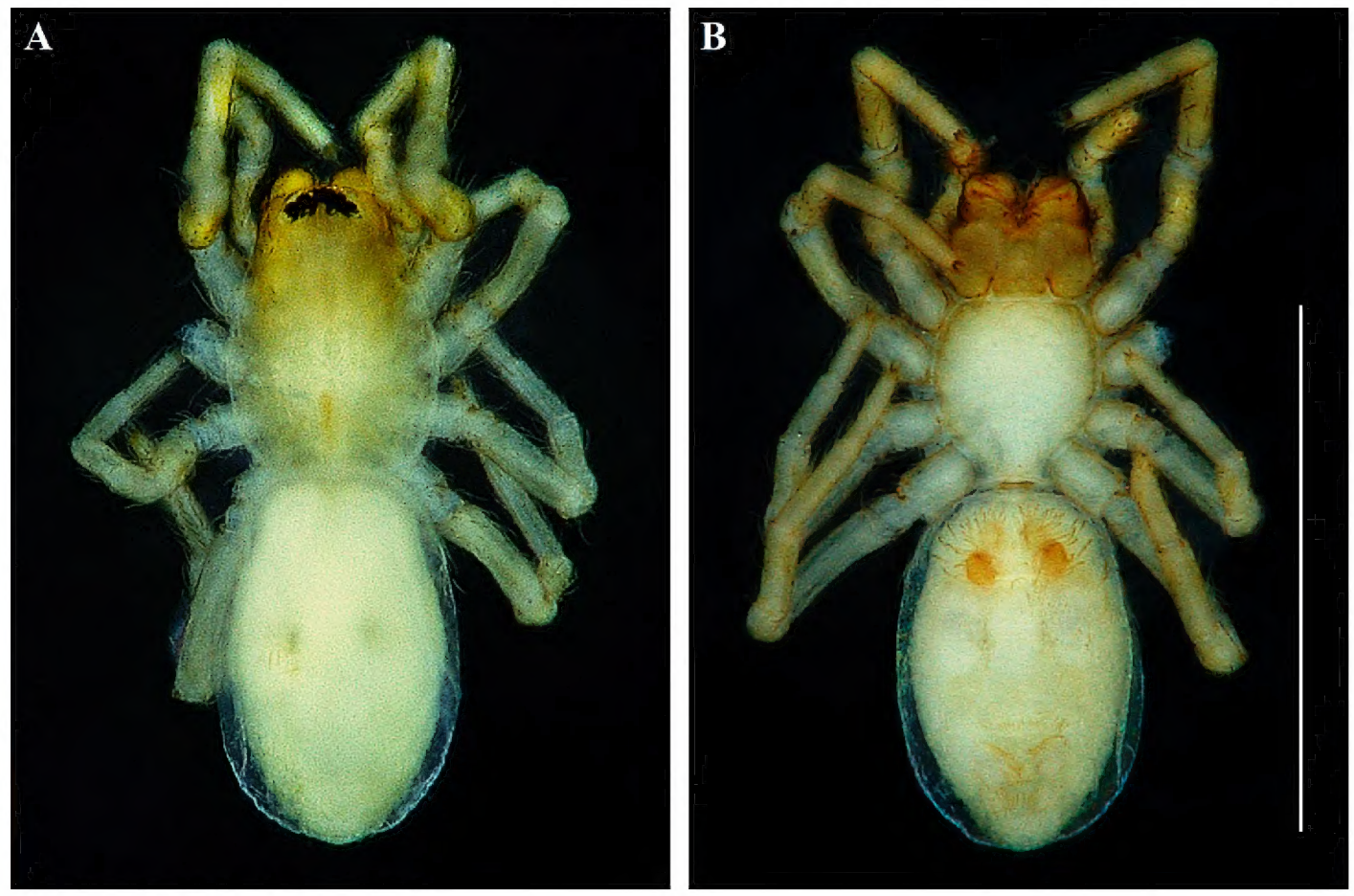

Figure 13. *Trichoncyboides simoni* (Lessert, 1904), female from Slovakia. **A.** Dorsal view. **B.** Ventral view. Scale bar = 1 mm.

Figure 14. *Trichoncyboides simoni* (Lessert, 1904), female from Slovakia, vulva. Scale bar = 0.1 mm.

Identification. Habitus: body length of our specimen is slightly greater than maximal body length published by Nentwig et al. (2024). **Epigyne:** protrudes, copulatory openings on anterior margin of epigastric furrow; fertilization ducts broadly lateral and aboral branched; seminal receptacles visible (Thaler 1973; Nentwig et al. 2024) (Figure 14).

Measurements of the specimen (♀) (Figure 13). Body length 1.15; carapace 0.47 long, 0.33 wide; opisthosoma 0.68 long, 0.47 wide.

Comment. This species occurs in a wide range of habitats, like forest steppes, deciduous forests, coniferous forests, and forest stands (Thaler 1973; Buchar and Růžička 2002; Nentwig et al. 2024).

DISCUSSION

Altella aussereri has so far been known only as an endemic of the Italian Southern Alps, so our record not only extends the range of this species much further north but also provides new data on the occurrence of the species in another mountain system, the Carpathian Mountains. Records from the Alps are known from altitudes of 420–470 m (Thaler and Noflatscher 1990). Our record comes from 330 m, which is close to this range. It is likely that due to its preference for warm xerothermic localities (Thaler and Noflatscher 1990), *A. aussereri* does not inhabit the higher parts of the Alps. Thaler and Noflatscher (1990) used pitfall traps to capture *A. aussereri* individuals. However, our finding of this species from soil samples, extracted by Berlese-Tullgren funnels, may mean that it is a spider species that inhabits the soil profile in addition to the soil surface. Thaler and Noflatscher (1990) also noted that delineation of the species' distribution area can be complicated due to the problematic determination of species in the genus *Altella*. Therefore, *A. aussereri* may in fact not be as rare as thought. In the Italian Alps the species is only known from dry grasslands and scrub oak woodlands (Thaler and Noflatscher 1990). Our record is from a very similar habitat, specifically a sparse xerothermic forest. Based on our findings, we recommend conducting studies with methodologies aimed at trapping soil-dwelling fauna (soil sampling, basket traps, Cul-de-sac traps) in xerothermic habitats of other mountain ranges of the Carpathian Arc. In terms of the phenology of the species, it is interesting to note that alpine individuals were captured between late February and mid-May (females between late April and mid-May) (Thaler and Noflatscher 1990), whereas our female was captured in early November.

Our records of *Mimetus laevigatus* in Slovakia mean that this species is now known from a second Central European country. The first country was Hungary (Chyzer and Kulczyński 1918), where it was found nearly 100 years ago at localities around Lake Balaton (Balogh 1933). *Mimetus laevigatus* inhabits a wide range of habitats in the Mediterranean and warmer continental regions of the Palearctic. Records from sand dunes are known from the Caucasus (Ponomarev and Komarov 2013). It inhabits sandy habitats in Armenia as well, where it is also known from meadows with lava stones, collapsing clay cliffs near water and canyons (Zarikian et al. 2022). In Cyprus, it inhabits forests, phrygana, and muddy ground of reedbeds (Bosmans et al. 2019). This spider species is also very often found arboreal. At the localities in Cyprus, individuals of this species were frequently beaten from shrubs in pine and cedar forests, or they occurred on higher vegetation from where they were swept. Similarly, it has been found on the branches of

coniferous trees in Türkiye (Lecigne 2021). In Morocco, specimens of this species have been collected from olive trees (Mousaid and Bouihouline 2023). Our specimen from the Slovak Karst was also retrieved from the tree canopy, specifically from an orb web of *Tetragnatha* sp. that this individual probably hunted or fed on. This specimen was found in an ecotone consisting of south-facing, calcareous, grassland, and stunted deciduous forest. Although this species occurs in agricultural habitats of olive groves (Picchi 2020) and in other semi-natural habitats such as herbs in ruins (Bosmans et al. 2019) and walls (Tamajón et al. 2017), in addition to natural habitats, data from house interiors are lacking so far. We therefore assume an accidental wandering or introduction into the interior of a house for our finding of a male *M. laevigatus* in the Burda Mountains. Given the araneophagous nature of the species (Roberts 1995), targeted feeding on synanthropic spider species (*Pholcus*, *Steatoda*, etc.) or in the case of this adult male, finding a female for mating, cannot be ruled out. Our individuals were captured in July and August, which is after the mating period for this species as described in the literature, with adults appearing in May to June (Nentwig et al. 2024).

The record of *Trichoncyboides simoni* in Slovakia adds additional information on the occurrence of this species in Central Europe, where it is already known from Germany, Switzerland, Austria, Czech Republic, and Hungary. It is an obscure species with a little-known biology and, apparently, a preference for a wide range of habitats (Heimer and Nentwig 1991; Nentwig et al. 2024). In the Czech Republic it has been found in woodland oak woods and conifer stands (Buchar and Růžička 2002), and in Tirol (Austria) on the slopes of the Alps in habitats of warm rocky forest-steppes and sparse pine forests (Thaler 1973). The record from Switzerland is from detritus in deciduous forest (Thaler 1973), which is a similar habitat type to our record from Slovakia, which was obtained from a soil sample from oak–hornbeam forest. Adults are known to occur from April to June (Buchar and Růžička 2002; Thaler 1973). Our specimen was captured earlier, in mid-March.

New record of *A. aussereri* extends the known distribution of this species to the Carpathian Mountains, thus proving that it is not endemic to the Italian Alps. The new records of *M. laevigatus* and *T. simoni* in Slovakia extend their known distribution in Central Europe. In summary, our records show that the araneofauna of Slovakia is still not sufficiently known and new and exciting species records, especially from rare and undersampled habitats and regions (see also Gajdoš et al. 2023), are to be expected.

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ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contributions

Conceptualization: PP, PG. Methodology: PP, PG, MŘ, NG, MP. Resources: MŘ, NG, JČ, MP. Supervision: PG. Visualization: PP, MŘ, NG, JČ. Project administration: PP. Software: PP, MŘ, NG, JČ. Writing – original draft: PP. Writing – review and editing: PG, MŘ, NG, MP.

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Data availability

All data that support the findings of this study are available in the main text.

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